AIRCRAFT CIRCULARS

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

No. 104

THE A. B. FLYGINDUSTRI "K 37" (SWEDISH JUNKERS)

A Low-Wing All-Metal Military Airplane

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THE A. B. FLYGINDUSTRI "K 37" (SWEDISH JUNKERS)*

A Low-Wing All-Metal Military Airplane.

The "K 37" is an unbraced all-metal low-wing monoplane, constructed with consideration of the well-known Junkers patents (Figs. 1, 2, 3 and 4).

In order to obtain greater efficiency, a single engine at the nose of the fuselage has been replaced by two radial engines in the wings, improving at the same time the observer's vision sidewise, forward, and vertically downward. One of the advantages of this arrangement and subdivision of power plant is the fact that the observer can look about in all directions, being situated in the front gunner's cockpit, in front of the propeller disk (Figs. 5 and 6). The position of the gunner's cockpit is, furthermore, advantageous as it leaves sufficient space for wireless and photographic equipment as well as for rigid armament.

Connection with the front gunner's cockpit, as well as with the rear machine-gun cockpit is afforded by means of a gangway at the right side of the fuselage (Fig. 1). This rear gunner's stand is equipped for the mounting of a twin machine gun with an emergency control.

The bottom of the fuselage has been fitted with a downward opening tunnel allowing the adjustment of a machine gun for rear

*From a circular issued by A. B. Flygindustri, Malmo.

cover downwards and with a clear foreground backwards (Fig. 7). In order to enlarge the effective rear defense range, the "K 37" has been equipped with a double rudder, which at the same time improves controllability.

For Long-Distance Scouting

Military and tactical requirements have been adhered to with the following result:

Reasonable climbing capacity and large radius of action.- With 4000 kg weight loaded, the "K 37" practically reaches a service ceiling of 6500 meters with a Jupiter VI engine, and 7300 meters with a Jupiter VII. The range of action is 1000 kilometers when starting with 4000 kg weight loaded. When fully utilizing the maximum allowable weight of 4300 kg, the duration of flight can be raised by two hours and consequently the range to 1350 km.

The "K 37" with the ample armament, and favored by the unbraced construction of wings and by the double rudders, virtually has no blind angle, and the simultaneous defense against various enemies offers no difficulties.

A series-picture apparatus or other photographic implements will be installed in the space situated between the pilot's cockpit and the front gunner's cockpit, and indirectly operated from the seat in the front cockpit.

As a Day Bomber

This type requires in general the same flight properties as the scout; of course it depends upon the volume and weight of the bomb load to be carried, up to which extent these properties can be accomplished.

Bombing installation.- The "K 37" is suitable for a total bomb load of 450 kg of every bomb type required. For using the well-known Bofors bombs a device has been designed for eight bombs of 50 kg, and for four bombs of 12.5 kg, which are to be fitted in two equal sets on both sides underneath the wings.

To suspend the bombs, a novel design is being used which, owing to its simplicity enables the bomb sets to be fastened or taken off in a few minutes. For this purpose the racks are provided with snap devices which only have to be pressed against the corresponding fastenings at the wings. Simultaneously, all connections from the bomb-dropping mechanism to the bomb rack become automatically intercalated, thus making it unnecessary to connect cables or handle adjusting screws (Fig. 8). The bomb-dropping mechanism admits of single, serial, and total bomb dropping, and is operated from the front gunner's cockpit.

As a Heavy Fighting Airplane

Military exigencies principally demand good flying properties and superior offensive fighting strength in the air. It

will not be difficult to attain such aims as long as one remains satisfied with a flight not lasting over three hours and with full throttle at 5000 meters height. On this supposition a weight loaded of 3800 kg would be sufficient. With Jupiter VII the "K 37" will then have a maximum speed of 237 km/h at 5000 meters, a service ceiling of 7600 meters, and a climb of 18.5 minutes, up to 5000 meters.

The great offensive fighting strength in the air will be obtained by means of a large caliber weapon mounted in the front gunner's cockpit. In using large caliber shells, the effect of each single hit will be multiplied as compared with the ordinary M.G. ammunition.

The material used in the "K 37" is chiefly duralumin, sheet steel being employed for joints, etc.

The girder framework consists of tubular spars and struts, partly braced with tubes and partly with sheet metal pressings. The whole structure is supported part by part, and the corrugated sheet metal assists in taking up torsional stresses.

The wing is subdivided into a center section, two intermediate wing sections, and two extreme wing sections.

Both engine beds are situated in front of the leading edges of wings. The gasoline tanks are mounted in the wings as shown in Figure 1. The different wing sections are connected to each other by means of spherical screw unions.

Fuselage.- The fuselage is of rectangular cross section with rounded corners, and is uniformly tapered toward the tail. The middle section of the fuselage is erected upon the center section of the wings and has an extra strong framework for protection of the crew. The entire fuselage is covered with corrugated sheet metal. The middle section contains the gunner's front cockpit, pilot's cockpit, and rear cockpit.

Controls.- The ailerons are equipped with inside and outside balance area. The stabilizer is fitted into the fuselage, placing the surfaces of the rudder and stabilizer in line. The stabilizer is braced on the under side and is provided with a five-point attachment, the forward point transmitting the stabilizer adjusting movement while the rear points of attachment are hinged and lie at the sides and in plane with the stabilizer stays. The elevator is equipped with inside and outside balance area. The areas of elevator are of ample size, so that stability is maintained with the airplane fully loaded and with the center of gravity well back. In order to maintain longitudinal level under varying conditions of load, the stabilizer is adjustable from the cockpit. The rudders are also equipped with inside and outside balance area.. The fins are mounted on the stabilizer by means of ball attachment and each is supported from the stabilizer by means of one strut. The stabilizer adjusting gear - torsion shaft, irreversible gearing and hand wheel with indicator - are installed close to the pilot's seat. All controls

are inside the fuselage and are readily accessible through large inspection flaps at all important and essential control joints. Push rods, shafts, bell cranks, and ball bearings are used extensively.

Landing gear.- The landing gear is built of tubular struts streamlined with duralumin, and linked to fuselage in triangle form and supported to under side of wings. The axles are attached to strut joints by rivets. The large travel of the elastic shock absorbers makes the landing gear especially suitable for use on rough ground. The tail-skid attachment is readily accessible for inspection by removing tail section of fuselage. The snow skids are made of duralumin. The tail snowshoe is bolted on to tail skid.

Power Plant

Engines.- Two Gnome-Rhone Jupiter VI (or Bristol)

n = 2000, N = 432/480 (600) hp

Total 864/960 (1200) hp

Compression ratio 1 : 6.5

or

Two Jupiter VII (with compressor)

n = 1950, N = 350/420 hp

Total 700/840 hp

Compression ratio 1 : 5.3

are used, operating an Aeron-Reed metal propeller.

The engine is well cowled and is easily accessible at all

parts by means of large flaps and a removable bonnet. The engine mounting is constructed of duralumin and the whole is well streamlined.

Fuel installation, as previously mentioned, consists of one tank installed in the center section of 180 liters; two tanks in wing (1 right and 1 left) 150 l each; two tanks in wing (1 right and 1 left) 115 l each; and two tanks in the intermediate wing section (1 right and 1 left) 180 l each.

The fuel pumps consist of two engine-driven and one Allweiler hand pump.

Specifications of Capacities

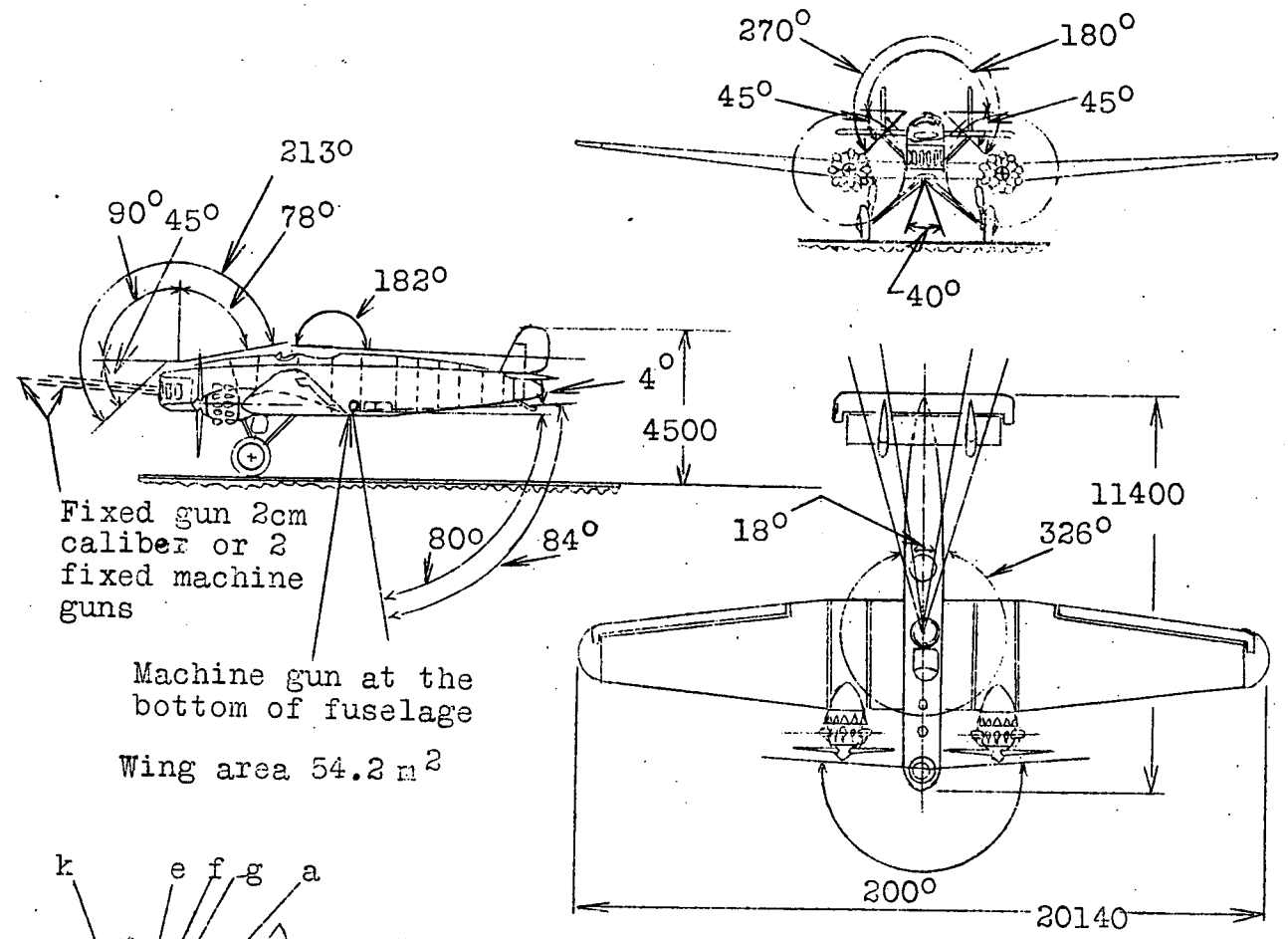
Engine	Jupiter VI 432/480 (600) hp, 1:6.5		Jupiter VII with compressor 420/440 hp, 1:5.3	
Weight loaded	4000 kg	4300 kg	4000 kg	4300 kg
Maximum speed at 2000 m	145 m.p.h. 232 km/h	– 232 km/h*	–	–
at 3500 m	–	–	153 m.p.h. 245 km/h	– 243 km/h
at 5000 m	– 217 km/h	– 214 km/h	147.5 m.p.h. 236 km/h	– 234 km/h
Cruising speed at 2000 m	195 km/h	195 km/h	–	–
at 3500 m	–	–	210 km/h	210 km/h
at 5000 m	–	–	220 "	220 "

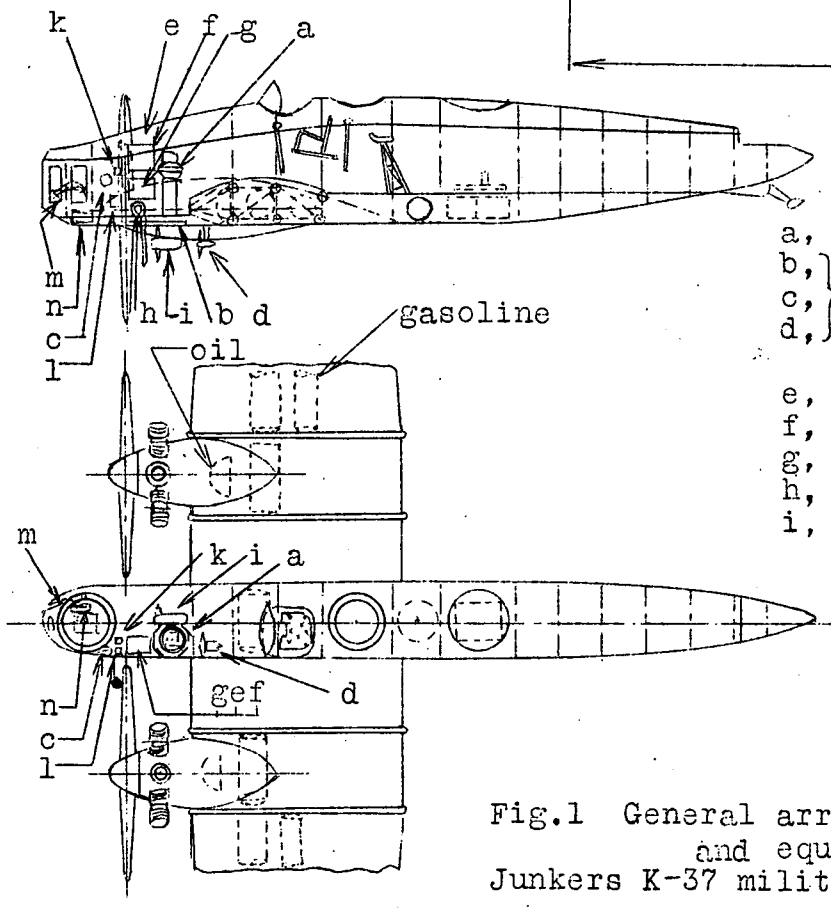
*Including bombs 6 to 8 km/h less.

Landing speed at take-off weight	72 m.p.h. 115 km/h	– 118 km/h	– 115 km/h	– 118 km/h	
Ceiling (0.5 m/s climbing speed)	6500 m	6000 m	7300 m	6800 m	
					10%
Theoretical ceiling absolute	7000 m	6600 m	7800 m	7300 m	
Time of climb					
0–1000 m	3.0 min.	3.5 min.	3.75 min.	4.25 min.	
2000 "	6.8 "	7.5 "	7.5 "	8.5 "	
3000 "	11.2 "	12.5 "	11.25 "	12.75 "	
4000 "	17.0 "	19.0 "	15.0 "	17.5 "	15%
5000 "	25.0 "	28.0 "	20.0 "	23.0 "	
6000 "	38.0 "	–	27.0 "	32.0 "	
Ceiling	46.0 "	45.0 "	47.0 "	46.0 "	
Taking-off length	200 m	250 m	200 m	250 m	
Run-out, length at take-off weight	320 m	350 m	320 m	350 m	25%
Wing loading	74 kg/m²	79 kg/m²	74 kg/m²	79 kg/m²	
Power "	4.2 kg/hp	4.5 kg/hp	5.13 kg/hp	5.5 kg/hp	

Fuel consumption in kg/h*	Full throttle		Throttled	
	at 2000 m	5000 m	2000 m	5000 m
2 Jupiter VI	220 kg/h	155 kg/h	160 kg/h	110 kg/h
	at 3500 m	5000 m	3500 m	5000 m
2 Jupiter VII (comp.)	220 kg/h	170 kg/h	146 kg/h	120 kg/h

*As per statement of engine constructors

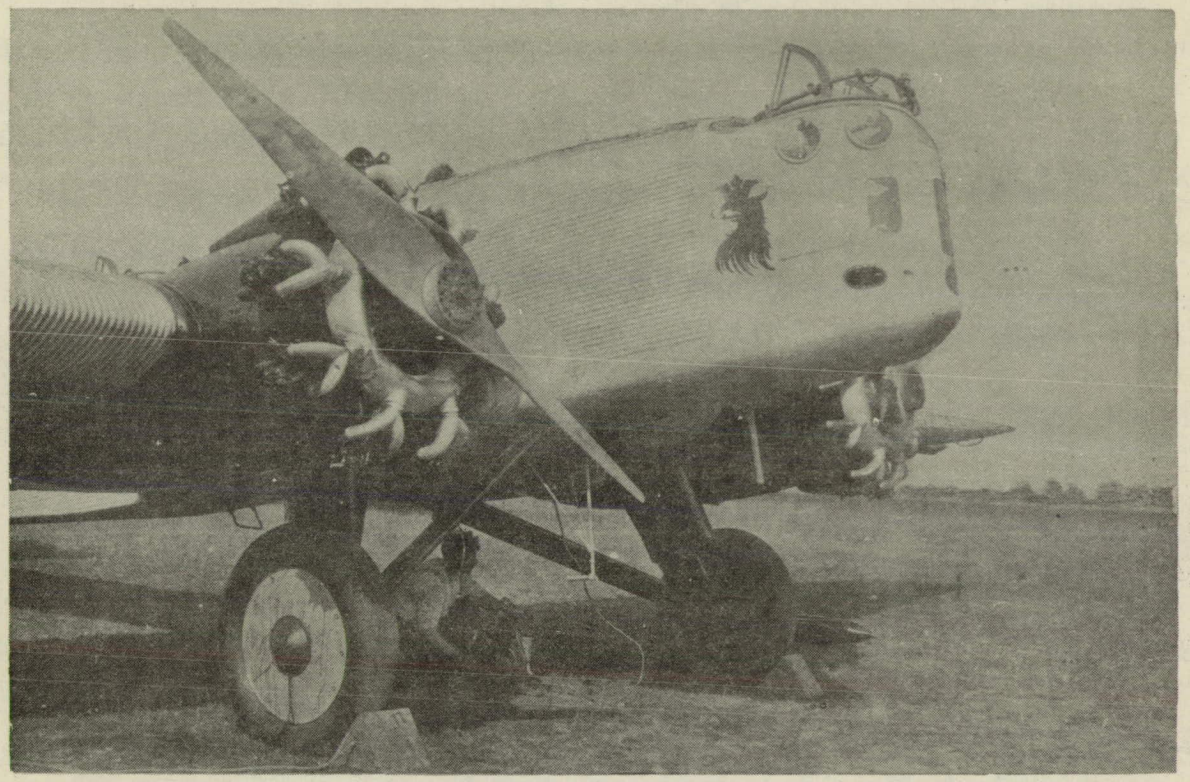


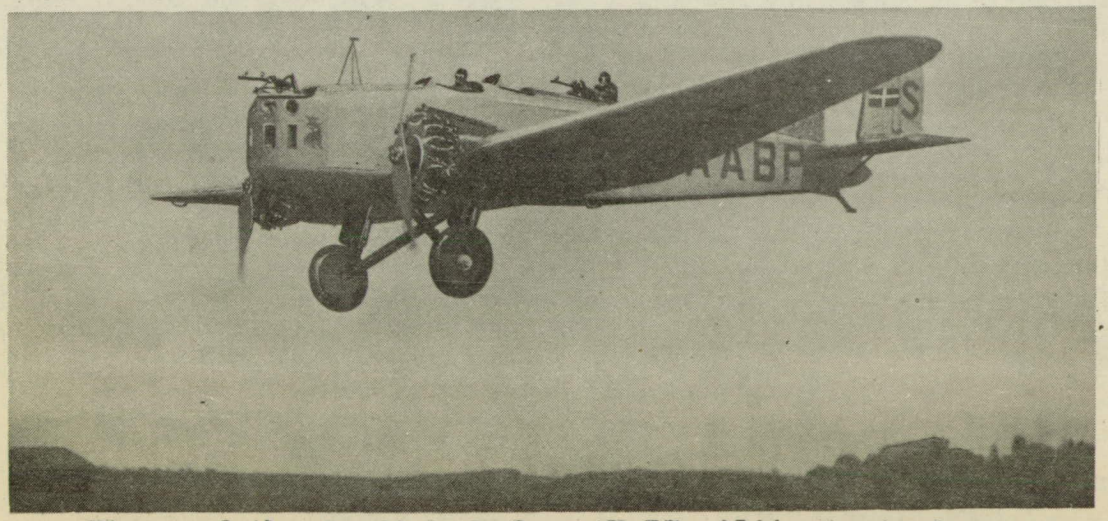


Photographic
a, photographic apparatus.
b, c, d, parts of the photographic mechanism.

Radio plant
e, receiver.
f, transmitter.
g, potential regulator.
h, reel for aerial.
i, generator with adjustments.
k, Morse-key
l, fuse box
m, Very pistol
n, case for Very lights

Fig.1 General arrangement, firing zone and equipment of the Swedish-Junkers K-37 military airplane.





Views of the Swedish-Junkers K-37 military airplane

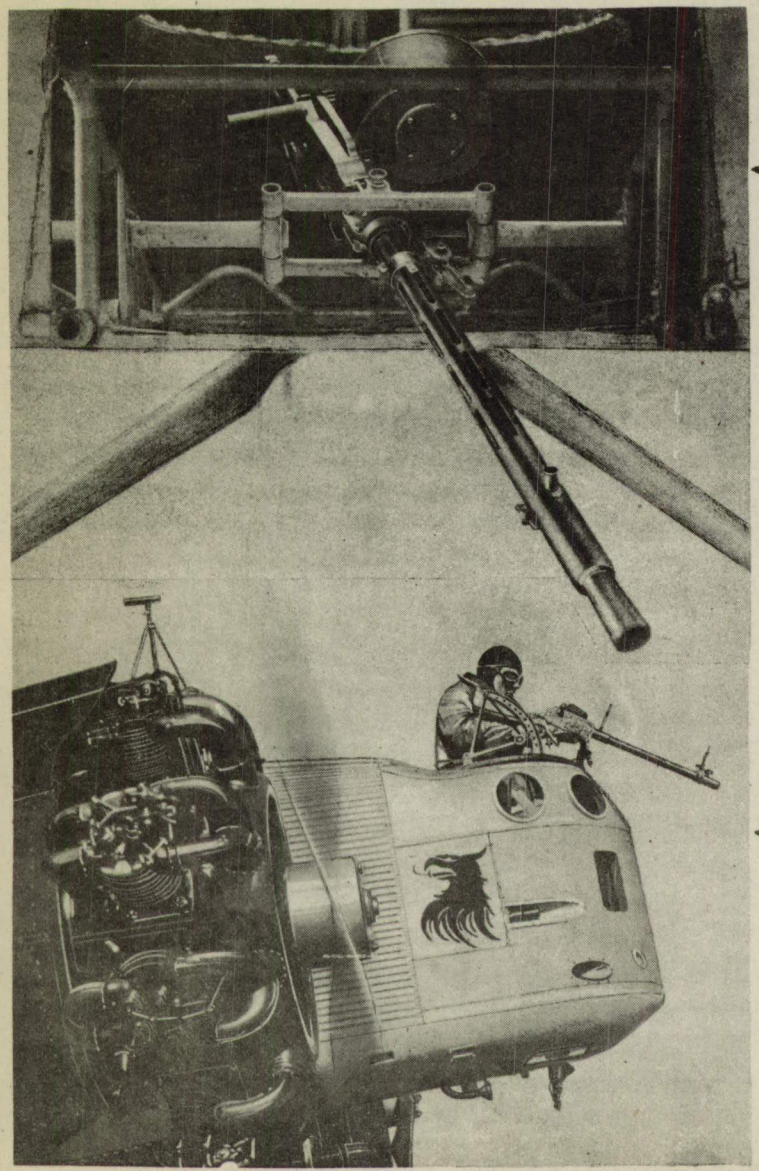


Figure 7

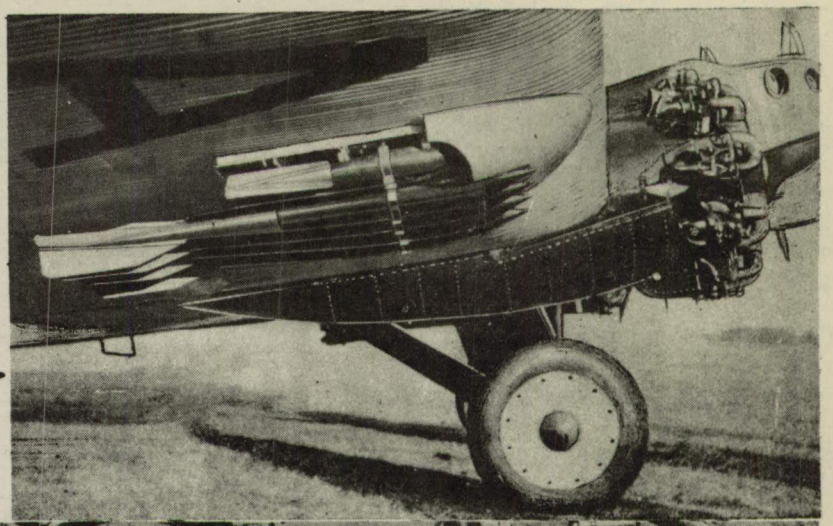


Figure 8

Figure 5

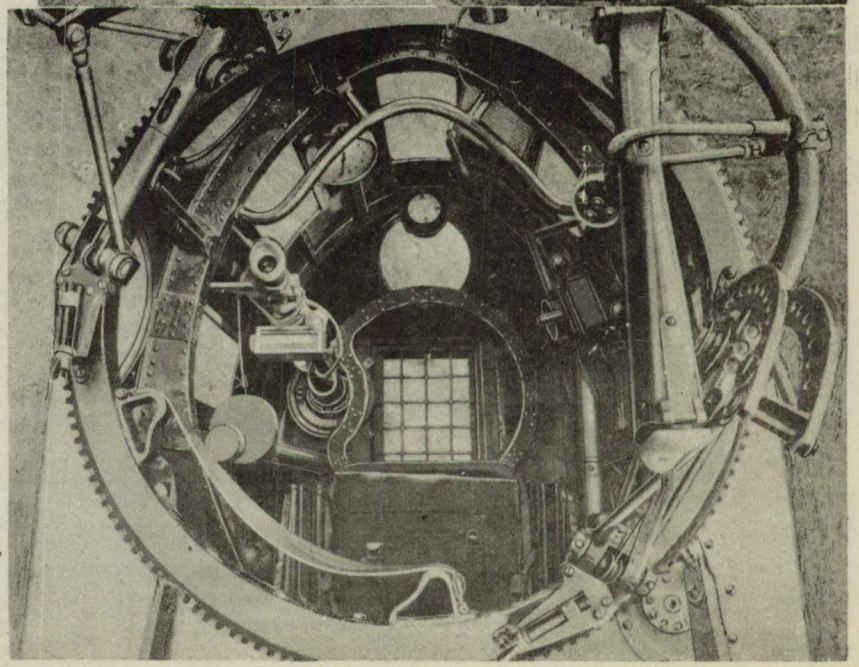


Figure 6

Views of the Swedish-Junkers K-37 military airplane